

Remarks

Claim 5 is pending herein. By this Amendment, claims 1-4 have been canceled, and claim 5 has been amended so that it is now an independent claim.

In the Office Action, claims 1-3 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Publication No. 2002/0004359 to Arai in view of JP2000-173954A (“JP ‘954”); and claims 4 and 5 are rejected under §103(a) as being unpatentable over Arai in view of JP ‘954 and further in view of “Applicants’ Admitted Prior Art”. According to the Office Action, JP ‘954 is in the same patent family as U.S. Patent No. 6,428,393 to Yukawa et al. (“Yukawa”) and, consequently, is being relied upon as an English-language translation of JP ‘954.

In view of the amendments and remarks herein, Applicants respectfully request reconsideration and withdrawal of the rejections set forth in the Office Action.

I. Rejection of Claims 1-3

Claims 1-3 are rejected under §103(a) as being unpatentable over Arai in view of JP ‘954. Claims 1-3 have been canceled. Thus, this rejection is moot.

II. Rejection of Claims 4 and 5

Claims 4 and 5 are rejected under §103(a) as being unpatentable over Arai in view of JP ‘954/Yukawa and further in view of the “Applicants’ Admitted Prior Art”.

As noted above, claims 1-4 have been canceled, and claim 5 has been amended so that it is now an independent claim. Independent claim 5 incorporates the contents of canceled claims 1 and 4.

According to the Office Action, JP ‘954/Yukawa teaches all aspects of claims 4 and 5 but does not teach the “fluid supply means” (claim 4) that provides “ionized air” (claim 5). However, in the preceding Office Action, the Examiner took Official Notice that the provision of a fluid supply means to a machining operation such that ionized air is provided to the workpiece at the time of machining in order to neutralize any static electricity created during the machining process is well-known in the art. The Examiner states that “this assertion (that the provision of a fluid supply means to a machining operation such that ionized air is provided to the workpiece at

the time of machining in order to neutralize any static electricity created during the machining process is well-known in the art) is taken to be admitted prior art because Applicant did not previously traverse the Examiner's assertion. See MPEP section 2144.03, section C, for example."

Therefore, according to the Examiner, it would have been obvious "to have provided such a fluid supply means supplied with ionized air to the Arai device in view of JP '954 such that the ionized air was supplied to the workpiece on the chuck table 15 at the time of machining for the well-known purpose of neutralizing any static electricity created during the machining process."

Applicants respectfully submit that claim 5 would not have been obvious over Arai in view of JP '954 and further in view of the "Applicants' Admitted Prior Art".

An object of Applicants' invention is:

to provide a processing machine capable of easily making a plurality of electrodes projecting from the front surface of a plate-like workpiece uniform in height, without causing a short circuit to occur between adjacent electrodes (instant specification at col. 2, lines 21-25).

The instant specification teaches that:

By the rotation of the semiconductor wafer 10 and the rotation of the cutting tool 33, the top end portions of the plurality of stud bumps (electrodes) 120 formed on the front surfaces of the semiconductor chips 110 of the semiconductor wafer 10 are cut away to make the stud bumps 120 uniform in height as shown in Fig. 13. (page 14, lines 9-14). [emphasis added]

At the time of the above processing, ionized air is ejected toward the semiconductor wafer 10 under processing from the nozzle 14 installed in the side of the processing area 25. By ejecting ionized air toward the semiconductor wafer 10 under processing, static electricity generated at the time of processing can be removed and further, a cooling effect is obtained. (page 14, lines 20-26). [emphasis added]

Because static electricity generated at the time of processing is removed via the ejection of ionized air toward wafer 10, part of the stud bumps (electrodes) cut away can be prevented from adhering to the surface of the workpiece due to static electricity.

Amended claim 5 recites the presence of a cutting unit having a cutting tool for cutting a plurality of electrodes projecting from the front surface of the plate-like workpiece arranged in the processing area and held on the chuck table to make them uniform in height and the presence of a processing fluid supply means for supplying ionized air toward the plate-like workpiece held on the chuck table in the processing area.

According to the Examiner, it is “well-known in the art to provide a fluid supply means to a machining operation such that ionized air is provided to the workpiece at the time of machining in order to neutralize any static electricity created during the machining process.” Applicants respectfully submit, however, that the Examiner’s asserted combination is improperly based upon hindsight because neither Arai nor JP ‘954/Yukawa teaches or suggests that static electricity is generated therein, or that the generation of static electricity is a problem. In other words, neither Arai nor JP ‘954/Yukawa provides any reason, suggestion or motivation to use the fluid supply means as asserted by the Examiner’s because neither such document teaches that static electricity is generated therein, or that static electricity poses a problem. The Examiner does not assert that static electricity is generated in either Arai or JP ‘954/Yukawa or that static electricity is a problem in the machining processes disclosed in these references.

Of the two references, only JP ‘954/Yukawa discloses the formation of “bumps” or “electrodes” (11) on the semiconductor wafer processed therein. Yukawa teaches the following:

these bumps 11 are embedded in the resin coating 12 as seen from FIG. 2. The bumps 11 can be exposed by removing a substantial thickness of resin coating by using one example of grinding wheel 13 according to the present invention as seen from FIG. 3. (col. 2, line 66 – col. 3, line 5). [emphasis added]

In removing a substantial thickness of resin coating 12 from the semi-fabricated semiconductor wafer to expose the underlying bumps 11 the wafer is put on the chuck table 37 with its resin coating up, and the turn table 36 is rotated to put the chuck table 37 in confronting position with the grinding wheel 13. The chuck

table 37 is rotated about its center, and the grinding unit 35 is lowered while the spindle 38 is rotated about its center of axis. Thus, the grinding wheel 13 is rotated and lowered to put its cutter blade 15 in contact with the wafer 10. The grinding unit 35 is lowered gradually, thereby permitting the cutter blade 15 to cut and remove resin material little by little. Finally the underlying bumps 11 are exposed to be coplanar with the resin coating 12. (col. 3, lines 46-59). [emphasis added]

Thanks to the rotating of the grinding wheel 13 about its center the resin coating can be removed evenly. (col. 4, lines 3-5) [emphasis added]

When the top surfaces of the bumps 11 are exposed to permit the bumps to be connected to selected electrodes of a printed circuit board, the grinding unit 35 is raised, and the chuck table 37 and the grinding wheel 13 are made to stop rotating. Then, the turn table 36 is rotated to bring another chuck table 37 just below the grinding unit 35, confronting with the grinding wheel 13 above the chuck table 37. The same procedure as described above is repeated to remove resin material as much as required for exposing the underlying bumps 11 from the resin coating 12. (col. 4, lines 6-16). [emphasis added]

Thus, instead of cutting the bumps or electrodes to make them uniform in height, Yukawa teaches the cutting away of the resin coating in which the bumps are embedded. Yukawa does not teach or suggest cutting the bumps or electrodes themselves to make them uniform in height. As noted in one of the above-quoted passages, Yukawa teaches that when the top surfaces of the bumps are exposed to permit the bumps to be connected to selected electrodes of a printed circuit board, the grinding unit is raised, and the chuck table and grinding wheel are made to stop rotating. Yukawa does not state teach how the bumps therein are formed or whether the bumps are uniform in height. Once the top surfaces of the bumps are exposed, then, whatever height or form they possessed in the resin coating, and regardless of whether static electricity is present, the top surfaces of the bumps are connected to selected electrodes of a printed circuit board.

Unlike Yukawa, Applicants' claimed invention and the stated object of the invention are concerned with manipulating the bumps or electrodes themselves. The claimed machine is designed to cut the electrodes to make them uniform in height and to supply ionized air toward the workpiece during processing to prevent the generation of static electricity which in turn prevents cut-away portions of the bumps or electrodes from adhering to the workpiece. This is not taught or suggested in any of the references cited in the Office Action.

Thus, for at least the foregoing reasons, Applicants respectfully submit that claim 5 would not have been obvious over Arai in view of JP '954 and further in view of "Applicants' Admitted Prior Art".


III. Conclusion

In view of the amendments and remarks herein, Applicants respectfully request that the rejections set forth in the Office Action be withdrawn, and that claim 5 be allowed.

If any fees under 37 C. F. R. §§ 1.16 or 1.17 are due in connection with this filing, please charge the fees to Deposit Account No. 02-4300, Order No. 033773M067.

Respectfully submitted,
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